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ORIGINAL RESEARCH

Emergency Medical Services

Evaluating changes in the emergency medical services workforce: A preliminary multistate study

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Abstract

Objective: There is growing concern with the strength and stability of the emergency medical services (EMS) workforce with reports of workforce challenges in many communities in the United States. Our objective was to estimate changes in the EMS workforce by evaluating the number of clinicians who enter, stay, and leave.

Methods: A 4-year retrospective cohort evaluation of all certified EMS clinicians at the emergency medical technician (EMT) level or higher was conducted for 9 states that require national EMS certification to obtain and maintain EMS licensure. The study spanned 2 recertification cycles (2017–2021) for 2 workforce populations: the certified workforce (all EMS clinicians certified to practice) and the patient care workforce (the subset who reported providing patient care). Descriptive statistics were calculated and classified into 1 of 3 categories: EMS clinicians who entered, stayed in, or left each respective workforce population.

Results: There were 62,061 certified EMS clinicians in the 9 included states during the study period, and 52,269 reported providing patient care. For the certified workforce, 80%–82% stayed in and 18%–20% entered the workforce. For the patient care workforce, 74%–77% stayed and 29%–30% entered. State-level rates of leaving each workforce ranged from 16% to 19% (certified) and 19% to 33% (patient care). From 2017 to 2020, there was a net growth of both the certified (8.8%) and patient care workforces (7.6%).

Conclusions: This was a comprehensive evaluation of both the certified and patient care EMS workforce dynamics in 9 states. This population-level evaluation serves as the first step for more detailed analyses to better understand workforce dynamics in EMS.

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1 | INTRODUCTION

1.1 | Background

The strength and stability of the emergency medical services (EMS) workforce is of paramount importance to ensure the continuity of prehospital care for communities across the United States. Recently, there has been growing concern with the stability of the EMS workforce.[1–9] Unfortunately, methods for evaluating the stability of the workforce are not well defined; estimates of clinician turnover (a portion of workforce stability) vary from 6% to 30% annually in both regional and national samples of EMS clinicians, depending on the methodology used.[10–12]

The Bottom Line

There has been growing concern over the stability of the emergency medical services (EMS) workforce in regard to both recruitment and retention. This retrospective study using the National EMS Certification database begins to give us insight regarding turnover of the EMS workforce. In the 9 states examined, EMS professionals leaving the workforce ranged from 16% to 26%. Yet there was a 47% increase in EMS professionals entering the workforce when compared to those leaving, resulting in an overall 30% increase in the workforce.

1.2 | Importance

This large inconsistency in turnover rates, in part due to heterogenous workforce definitions, suggests the need for a clearly defined comprehensive evaluation of the EMS workforce using consistent, transparent, and reproducible measures.[13] Understanding the extent of turnover may also estimate the cost of turnover to EMS systems, both financially and in terms of consistency of operations. The loss of EMS clinicians in the mid- to late stage of a career may result in a potentially inexperienced workforce that could have implications for patient care. Additionally, there is a need to quantify changes in the EMS workforce beyond estimating those who leave. Understanding the entry and retention of clinicians in the workforce must be a priority in improving the stability of this critical component of the emergency medical care system.[14] Challenges to understanding the prehospital workforce include comprehensively defining the population of interest and accurately measuring changes in the workforce based on the limitations of our current data sources.

1.3 | Goals of this investigation

Increased instability in the EMS workforce raises concerns for the long-term reliability of the prehospital medical safety net used by many citizens in the United States. However, no clear methods for population-based workforce evaluation are currently described in the literature, and no national workforce databases exist. To begin evaluating this question, the objective of this study was to estimate changes in the EMS workforce in 9 states by evaluating the number of clinicians who enter, stay in, and leave the workforce over time. This was done by evaluating the entire certified population in these 9 states and the subset of this population who primarily perform patient care.

2 | METHODS

2.1 | Study design, setting, and population

A 4-year retrospective cross-sectional evaluation of changes in the EMS workforce among those certified at or above the emergency medical technician (EMT) level was conducted for 9 US states between 2017 and 2021. This was done by following all EMS clinicians who are licensed with a state and evaluating whether they entered, stayed in, or left the workforce. The location of each EMS clinician was based on self-reported recertification data including mailing address. The American Institutes for Research Institutional Review Board approved this study, and a waiver of documentation of consent was granted. Throughout this manuscript, the reporting of data are in-line with the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines for observational cohort studies (Appendix S1).[15]

National certification is required for initial licensure for at least 1 certification level in more than 46 states, territories, and federal agencies. In most states, continuous certification, including biennial recertification, is voluntary; however, 9 states require National EMS Certification to maintain state EMS licensure. These "recertification states" include Alabama, District of Columbia, Louisiana, Massachusetts, Minnesota, New Hampshire, North Dakota, South Carolina, and Vermont. Therefore, in these states, the National EMS Certification database from the National Registry of EMTs (NREMT) reflects the list of *all* EMS clinicians who are licensed and available to provide prehospital care.

Therefore, we leveraged the National EMS Certification database from 2017 to 2021 to identify the complete population of EMS clinicians in states that require National EMS Certification to maintain state EMS licensure. This population selection allows for the comprehensive identification of a defined population that, if followed over time, could be used to quantify EMS clinicians who decided to stay in, leave, or enter the EMS workforce in their state.

National EMS Certifications are valid for 2-year periods with expiration dates on March 31. In this study, 2 groups of EMS clinicians were followed through a single 2-year recertification cycle. Group 1 held National EMS Certifications that expired on March 31, 2017, and if renewed, would expire again on March 31, 2019. Group 2 held National EMS Certifications that expired on March 31, 2018, and if renewed, would expire again on March 31, 2020.

Two populations of EMS clinicians in recertification states between 2017 and 2021 were evaluated including (1) those who were aged 18 to 85 years old (the certified workforce), and (2) those who were aged

18 to 85 years old and reported a primary role of providing patient care (the patient care workforce). The patient care workforce is a subset of the overall, larger, certified workforce defined through self-reported verification of a primary role of providing patient care during their recertification process. Only those nationally certified at the EMT level or higher (EMTs, advanced emergency medical technicians [AEMT], and paramedics) were included in the analysis. The recertification process for emergency medical responders (EMRs) differs from the other certification levels, and therefore, EMRs were excluded.

2.2 | Measurements

As part of the initial certification and recertification process, optional demographic and EMS-related profile information was collected from nationally certified EMS clinicians. Demographic information included age, sex, race or ethnicity (dichotomized to non-Hispanic white [yes, no] due to the low proportion of minority EMS clinicians), and education level (high school/general educational development or less, some college, associate degree, bachelor's degree or more). EMS-related occupational information included certification level (EMT, AEMT, paramedic), full-time employment status (yes, no), number of EMS employment organizations (1, 2, or more), and primary EMS agency type (fire, hospital, tribal, government/non-fire, private, air medical, other). Community size was defined as urban/suburban and rural as defined by the US Census classification with urban areas having populations of 50,000 or more, urban clusters (suburban) with populations of 2500–50,000, and rural areas as those areas not included as urban or suburban.

Our primary outcome of interest was the workforce status of each EMS clinician (entered, stayed in, or left the workforce) relative to the workforce population evaluated (certification population or patient care population). The EMS clinicians meeting inclusion criteria in each certification year were identified. Certification years were then merged to represent recertification cycle cohorts (ie, years representing a 2-year recertification cycle) as noted previously. The workforce status of each EMS clinician was then assessed and classified as follows: (1) if an EMS clinician was present in the first year of a group's cycle (eg, cycle ending in 2018) and was also present in the second year of that group (eg, cycle ending in 2020), then they were determined to have "stayed"; (2) if an EMS clinician was present in the first year of a group, but not present in the second year, then it was determined that they "left"; and (3) if an EMS clinician was not present in the first year of a group, but was present in the second year, then they were determined to have "entered."

2.3 | Analysis

Descriptive statistics, presented as frequency (%) for categorical measures and mean (SD) for continuous measures, were calculated for each group, respectively, as well as for the full sample. The percentage of EMS clinicians staying in the workforce was calculated as the percentage of those who stayed compared to the total population of EMS clinicians in that year (those who stayed and those who left). The percentage of those leaving the workforce was the percentage who left in the state compared to the total population of EMS clinicians in that year (those who stayed and those who left). The percentage of EMS clinicians entering the workforce was the percentage who entered compared to the total population of the year (those who stayed and those who entered). All analyses were completed using STATA SE version 17 (StataCorp LP, College Station, TX).

3 | RESULTS

In the 9 evaluated states, the population of EMS clinicians in the certified workforce across Groups 1 and 2 totaled 62,061. The demographics and EMS profile-related characteristics for the 2 groups of the certified workforce are presented in Appendix S2. These characteristics are similar to the overall nationally certified population at-large from previous research on this population.[16] From this larger population, 52,269 (84%) reported primarily working as a patient care provider constituting the patient care population of the study.

3.1 | Certified workforce

A total of 24,949 EMS clinicians held certifications in 2017 that expired in 2019 (Group 1) and 80% (n = 20,068) stayed in the certified workforce (Figure 1). Accounting for those leaving and entering the workforce, there were a total of 26,742 EMS clinicians in the certified workforce in Group 1 (Figure 1). In Group 2, out of 23,692 EMS clinicians with certifications in 2018, 82% (19,443) stayed in the certified workforce in 2020. After accounting for the EMS clinicians who left and entered the certified workforce, there were 26,188 EMS clinicians in Group 2 in 2020. This amounted to a 7.2% net growth of the certified workforce in Group 1, 10.5% net growth in Group 2, and 8.8% net growth overall.

Rates of leaving the certified workforce were evaluated per state over both cohorts combined (Figure 2). Rates of EMS clinicians leaving the workforce per state ranged from 16% to 26%. Rates of those who stayed in and entered the certified workforce, evaluated per state, are noted in Table 1. Those who stayed in the certified workforce per state ranged from 62% to 81% and those who entered the certified workforce ranged from 19% to 37%.

3.2 | Patient care workforce

A total of 20,407 EMS clinicians in the patient care workforce held certifications in 2017 that expired in 2019 (Group 1) and 74% (15,190) stayed in the patient care workforce (Figure 3). Accounting for those leaving and entering the workforce, there were a total of 21,486 EMS clinicians in the patient care workforce in Group 1 (Figure 3). In Group 2, out of 19,233 EMS clinicians with certifications in 2018, 77%

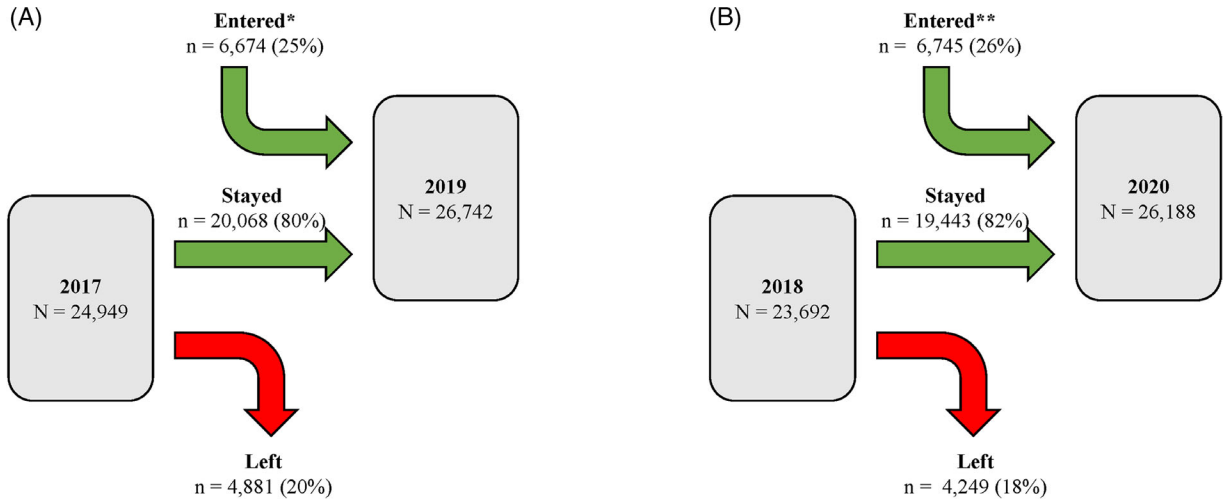

FIGURE 1 EMS clinicians recertifying, leaving, and entering the certified workforce in Group 1 (2017–2019, Panel A) and Group 2 (2018-2020, Panel B). *Percentage of total EMS clinicians newly certified in Group 1. **Percentage of total EMS clinicians newly certified in Group 2. Abbreviation: EMS, emergency medical services.

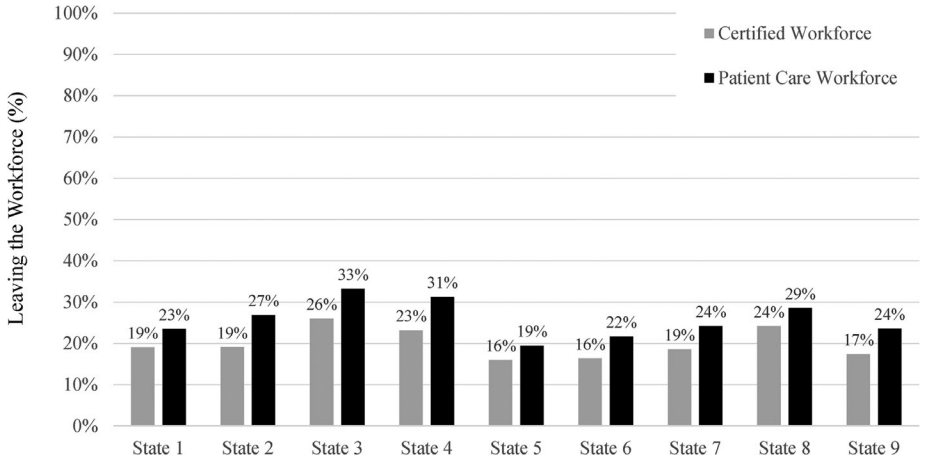

FIGURE 2 Percentage of EMS clinicians leaving each workforce across both groups, by state. Abbreviation: EMS, emergency medical services.

(14,851) stayed in the patient care workforce in 2020. After accounting for the EMS clinicians that left and entered the patient care workforce, there were 21,183 EMS clinicians in Group 2 in 2020. This amounted to a 5.3% net growth of the patient care workforce in Group 1, 10.1% net growth in Group 2, and 7.6% net growth overall.

Rates of leaving the patient care workforce were evaluated per state over both groups combined (Figure 2). For the patient care population, leaving rates ranged from 19% to 33%. Rates of those who stayed and entered the patient care workforce, evaluated were state, are noted in Table 1. Those who stayed in the patient care workforce per state ranged from 57% to 81% and those who entered the patient care workforce ranged from 19% to 43%.

3.3 | Limitations

In this evaluation, the presence or absence of a given EMS clinician's national certification and/or role in patient care were used to determine their status relative to the certified and patient care workforces, respectively. However, because our analysis was limited to recertification states only, we were unable to determine the exact percentage of EMS clinicians truly leaving the profession versus leaving a state. At this time, determining a true overall percentage is not feasible, because there is no existing data set inclusive of all EMS clinicians nationally. A small proportion of EMS clinicians may live and work in different states, and we could not account for the number of EMS clinicians holding multiple state certifications in recertification states (eg, certification in neighboring states of Massachusetts, New Hampshire, and Vermont or Minnesota and North Dakota). Therefore, we chose to focus on changes within a state to describe each workforce and help states direct their efforts on retention and recruitment based on their specific workforce changes. It is possible, however, that although an individual may have left a given workforce in a recertification state, they may have entered a non-recertification state and did not truly leave the national workforce. Due to this, there is a potential for misclassification bias that may overestimate the number leaving if an EMS clinician moved

TABLE 1 Total EMS clinicians who stayed and entered each workforce across 2 groups, by state.

Certified workforce	Stayed (present in both years of groups)		Entered (present in second year of groups)	
State	*N*	%[a]	*N*	%
State 1	5779	73.7%	2060	26.3%
State 2	1540	77.9%	436	22.1%
State 3	513	62.9%	302	37.1%
State 4	5894	62.6%	3524	37.4%
State 5	8129	81.2%	1885	18.8%
State 6	3119	76.6%	955	23.4%
State 7	7069	75.7%	2265	24.3%
State 8	1075	68.2%	501	31.8%
State 9	6393	81.1%	1491	18.9%
Patient care workforce	**Stayed (present in both years of groups)**		**Entered (present in second year of groups)**	
State	*N*	%[a]	*n*	%
State 1	4467	81.3%	1027	18.7%
State 2	1098	70.7%	455	29.3%
State 3	376	56.7%	287	43.3%
State 4	4122	57.9%	3003	42.1%
State 5	6687	78.2%	1858	21.7%
State 6	2515	72.9%	937	27.1%
State 7	5217	70.9%	2140	29.1%
State 8	851	63.7%	485	36.3%
State 9	4708	76.5%	1450	23.5%

[a]Percentage expressed relative to second year of groups (ie, total of those staying in each workforce and entering each workforce, respectively). Abbreviation: EMS, emergency medical services.

to a neighboring state but continued to work in the previous recertification state. In this analysis, these individuals would be categorized as having left the given state workforce. Additionally, our analysis was limited to the 9 recertification states, and therefore these findings may not be generalizable to the rest of the nation. We recognize that EMS trends and characteristics across the United States are different, and those noted in one state may not be what is experienced in another. However, using these methods will allow for evidence-based conclusions on general workforce trends that can then be evaluated by other states. Future work should involve both quantitative and qualitative analysis to better understand these trends.

4 | DISCUSSION

The stability of the EMS workforce is critically important to maintain emergency prehospital care throughout the United States. In this study, we provide a description of a method, and the associated results, to reproducibly measure changes in the EMS workforce in 9 recertification states. This is the first population-based estimate of EMS workforce changes across multiple states in the United States. We found high rates of EMS clinicians leaving the study populations though both populations were still noted to grow during these times (certified: 8.8%, patient care: 7.6%). These population-level evaluations can help facilitate evidence-based conclusions about workforce strength and stability and serve as the first step for more detailed analyses to better understand the stability of the workforce in EMS.

We noted the overall growth of the EMS workforce throughout the study period for both the certified population and the patient care population. This growth appeared to be spurred by the entry of EMS clinicians into the workforce making it a significant factor in workforce stability. EMS clinicians entering the workforce accounted for

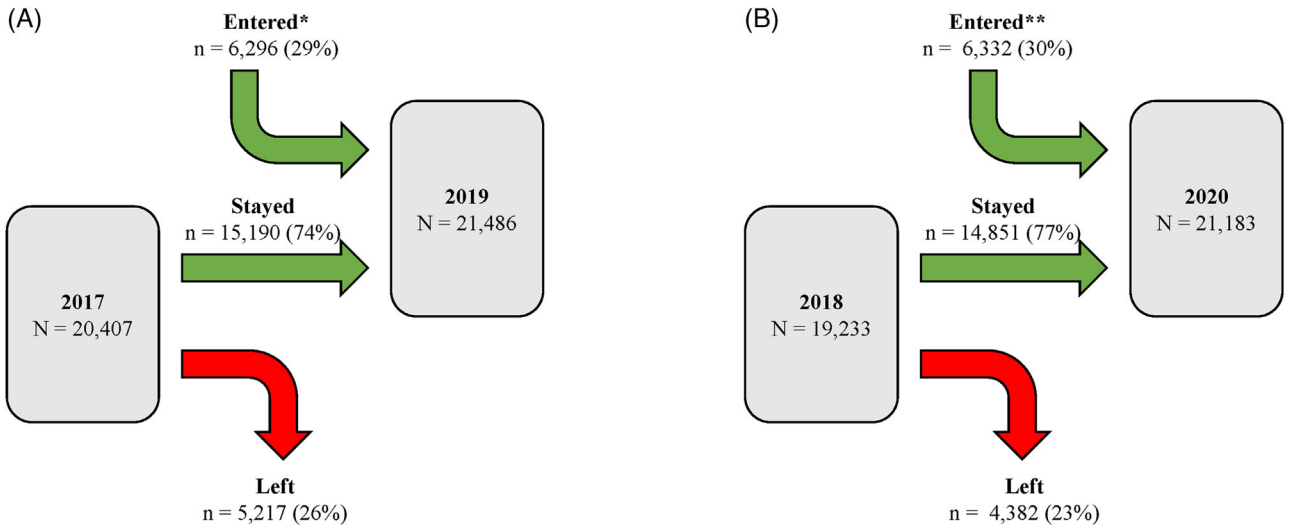

FIGURE 3 EMS clinicians recertifying, leaving, and entering the patient care workforce in Group 1 (2017–2019, Panel A) and Group 2 (2018–2020, Panel B). *Percentage of total EMS clinicians newly certified in Group 1. **Percentage of total EMS clinicians newly certified in Group 2. Abbreviation: EMS, emergency medical services.

26%–27% of the certified workforce and 31%–32% of the patient care workforce, respectively. This is a 47% increase in the certified workforce of EMS clinicians (30% increase in the patient care workforce) entering compared to those leaving. Per data from the National Registry dashboard, testing and certification volumes have continued to rise between 2011 and 2021 with first attempt pass rates being stable throughout this time.[17] However, one area of potential opportunity to increase entry into the workforce is through improving the successful completion of initial EMS education by students. The Committee on Accreditation of EMS Educational Programs highlighted this issue in 2019 and is collecting data to define the extent of the problem. In 2016, 13% of paramedic educational programs were unable achieve a threshold of 70% program completion rate.[18] Additional studies are needed to examine the relationship of EMS educational program completion rates and workforce stability.

The rates of EMS clinicians leaving each workforce (ie, turnover) for recertification states were noted to be approximately 18%–20% in the certified workforce and 23%–26% in the patient care workforce in this evaluation. This analysis also incorporated the complete picture of changes to each workforce by also quantifying the individuals who entered and stayed. Studies in the past have estimated several different turnover metrics, which all provide insight into the larger workforce challenges. One longitudinal analysis of EMS agencies measured a mean weighted turnover rate by the agency to be approximately 10.5% whereas another national sample measured the rate of clinicians leaving the workforce to be 4%.[19] Other studies have estimated the intention to leave EMS which was estimated at 6% in 2 evaluations.[10,19] More recently, the American Ambulance Association released their EMS Employee Turnover study, a non-peer-reviewed report describing a survey of EMS agency directors, demonstrating weighted agency-level average turnover rates among paramedics and EMTs ranging from 20% to 30%.[12]

Taken together, these studies provide insight into EMS turnover but are similarly limited by challenges with long term reproducibility (eg, data collection structure) and generalizability of results (eg, across agency types and roles within the agency). This study focused on managing these challenges by clearly defining 2 workforce populations and building a comprehensive data set across multiple states for enhanced generalizability and long-range trend tracking for both the total certified workforce and those providing patient care. Future work will focus on evaluating population-specific challenges including agency-level turnover, certification-level turnover, and the impact on volunteerism on changes to the EMS workforce. Further, understanding the cost implications of workforce turnover, both financially and operationally, will be important to continue highlighting the need to retain EMS clinicians and thereby enhance resilience in EMS agencies and the profession as a whole. Finally, work will be needed on a national level to build a database to assist in the evaluation of EMS workforce dynamics in the United States because no national database currently exists.

In this multistate evaluation of the EMS workforce, we found substantial change in state-specific workforce population, including approximately 1 in 4 certified clinicians leaving that specific state workforce. The rate among the patient care workforce was higher; however, the rate of entry of new EMS clinicians was high enough to replace those who left and drove an overall growth of the EMS workforce in these states by about 8% per recertification cycle. This population-level evaluation can help facilitate evidence-based conclusions about workforce strength and stability and serves as the first step for more detailed analyses to better understand workforce changes in EMS.

AUTHOR CONTRIBUTIONS

Jordan D. Kurth, Jonathan R. Powell, and Ashish R. Panchal conceived and designed the study. Jordan D. Kurth, Jonathan R. Powell, and Ashish R. Panchal collected the data. All authors analyzed and interpreted the data and drafted the manuscript. All authors contributed substantially to the revision of the manuscript. Jordan D. Kurth takes responsibility for the paper as a whole.

CONFLICT OF INTEREST STATEMENT

The authors report there are no competing interests to declare.

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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